a sidestream $O_2$-analyser (LUFU system (Dräger Medical AG, Luebeck, Germany)). FRC, respiratory compliance, $paO_2/FiO_2$ (PF-ratio) and $paCO_2$ were recorded at baseline, after a standard suctioning procedure with disconnection of the ventilator (20 sec, 14 F catheter, 200 mmHg negative pressure) (post ETS), and after a standard recruitment manoeuvre (PEEP 15 mbar, PIP 35 – 40 mbar for 30 sec) (post RM).

**Results and Discussion:** FRC decreased post ETS (3.2L ± 1.2) compared to baseline (3.4L ± 1.1, $p = 0.046$) and increased post RM compared to post ETS (3.5L ± 1.0, $p = 0.039$). Compliance showed a similar course. $paCO_2$ decreased and PF-ratio increased post RM compared to post ETS ($p = 0.005$, $p = 0.026$, respectively). Relative FRC changes post ETS and absolute differences of FRC post ETS correlated to changes of PF-ratio post RM (Pearson: -0.896, $p < 0.001$, Pearson: -0.792, $p < 0.001$, respectively).

**Conclusion(s):** In post cardiac surgery patients changes of FRC after alveolar de- and recruitment can be detected at bedside using the oxygen washout technique. There was a strong association of a FRC-decrease after open ETS with an improvement of oxygenation from a consecutive RM. A FRC decrease may help to identify those patients who profited from a RM in terms of increased oxygenation, even in absence of blood gas data.

**Acknowledgements:** The LUFU-system was provided by Dräger Medical, Lübeck, Germany.

**References:**

1 Heinze, Schaaf, Grefer, Klotz, Eichler: The accuracy of the oxygen washout technique for functional residual capacity assessment during spontaneous breathing. Anesth Analg 2007; 104: 598–604.

2 Heinze, Sedemund-Adib, Heringlake, Gosch, Gehring, Eichler: The impact of different step changes of FiO2 on functional residual capacity measurements using the oxygen washout technique in ventilated patients. Anesth Analg 2007; in press.

## 5AP3-2

### Respiratory status that facilitates subclavian venous catheterization

N. Kato, Y. Asakura, Y. Fujiwara, J. Harada, T. Komatsu

*Department of Anesthesiology, Aichi Medical University, Nagakute, Aichi, Japan*

**Background and Goal of Study:** Cannulation of a large central vein is performed for a number of therapeutic interventions such as providing secure vascular access for the administration of vasoactive drugs. Since its introduction in the 1960s, the subclavian vein has remained as an important portal for central venous cannulation. Since subclavian vein is located just adjacent to the pleural cavity and its vascular volume may be influenced by respiration, we were interested in the respiratory status that facilitates the subclavian venous catheterization.

**Materials and Methods:** Ten healthy volunteers were placed in the supine position, and the right subclavian vein was visualized by placing the 4.0-10.0MHz linear transducer probe (GE LOGIQ Book XP, San Jose, CA) in the infraclavicular place. To quantify the decrease of subclavian venous flow, we measured the average velocity of the subclavian vein through the Doppler signal both at the end-inspiratory and at the end-expiratory periods. The flow can be quantified by multiplying the time average velocity (centimeters per second) by the calculated area (square centimeters) of the vessel.

**Results and Discussion:** Since subclavian vein is compressed at the end-inspiratory period just between the clavicle and the thoracic cavity and the diameter decreases.

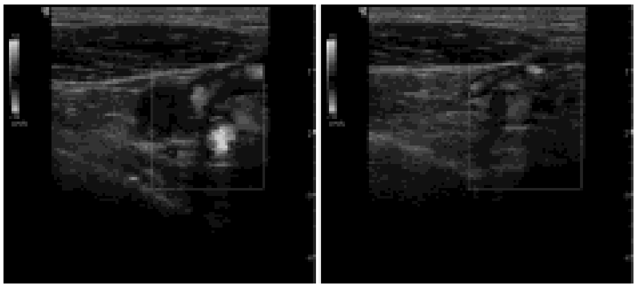


Figure 1

The mean subclavian venous flow at the end-expiratory period was 114.26 mL/min, while the mean flow at the end-inspiratory period was 12.59 mL/min (*two-tailed student t-test; p<0.0001*). Our results indicate that vascular volume of subclavian vein significantly decreases at an end-inspiratory period, which makes the vascular access at that period especially difficult.

**Conclusion(s):** At the end-inspiratory period, the vascular volume of the subclavian vein becomes extremely small, in contrast to internal jugular vein.

## 5AP3-3

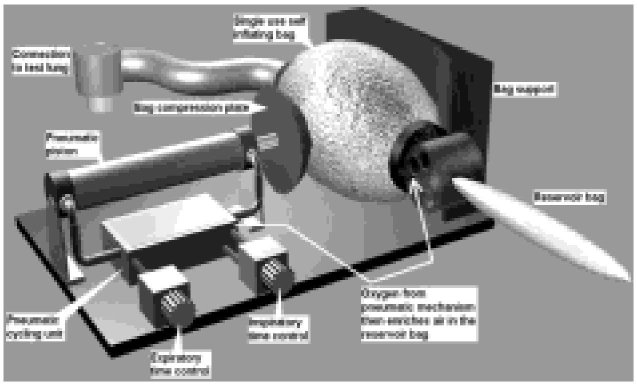
### A low cost, low oxygen consumption mechanical ventilator to meet a pandemic surge

M. Thornton, D. Williams, J. Dingley

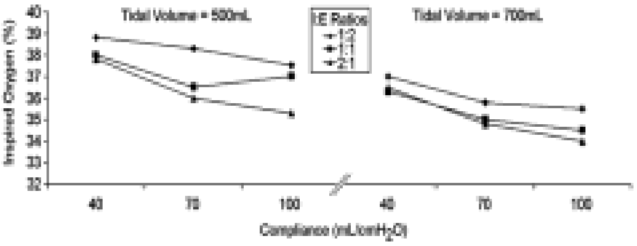
*Department of Anaesthetics, Morriston Hospital, Swansea, Wales, United Kingdom*

**Background and Goal of Study:** The UK plan for an influenza pandemic predicts up to 750,000 additional deaths, hospital capacity meeting only 25% of demand, limited "surge capacity" and need to prioritise patients against resources. Experience of previous pandemics suggests this may result in a shortage of mechanical ventilators and oxygen, with recruitment of wards as ITU areas. To meet such demands we propose a novel gas-efficient low cost pneumatic ventilator. We investigated the effect of different lung compliances (i.e. different ventilator workloads) on the delivered inspired oxygen fraction ($F_IO_2$).

**Materials and Methods:** The 4bar oxygen powered device compressed a single-use self-inflating bag, "waste" oxygen then entering the reservoir, enriching the air within. This device, constructed from readily available industrial components, ventilated a test lung over a range of rates, I:E ratios, tidal volumes, with compliance settings representative of normal/diseased lungs. Data collected included oxygen consumption and $F_IO_2$.



**Results and Discussion:** Oxygen consumption was 0.91(0.2)$L.min^{-1}$ and 1.12(0.27)$L.min^{-1}$ at tidal volumes of 500ml and 700ml respectively. The $F_IO_2$ increased marginally as the lung compliance was reduced, reflecting increased workload of the oxygen powered pneumatic mechanism and consequent increase in "waste" oxygen delivery to the reservoir bag.



**Conclusion(s):** This initial study suggests the potential to produce a gas powered volume controlled ventilator with an extremely low oxygen consumption. It can be used on any ward where piped oxygen is available, and no piped air or electricity is required. The use of a single use self-inflating bellows prevents cross contamination and provides the one-way and safety overpressure valves required. The low cost ventilator mechanism could also be single use, and could be stockpiled for crises where there is an overwhelming demand for mechanical ventilation.

## 5AP3-4

### Hyperoxic ventilation increases 6h-survival during extreme anemia and concomitant tachycardia

H. Kertscho, P. Lauscher, L. Raab, O. Habler, J. Meier

*Departement of Anesthesiology, Intensive Care Medicine and Pain Control, Johann Wolfgang Goethe-University, Frankfurt, Germany*

**Background and Goal of Study:** Administration of 100% oxygen (hyperoxic ventilation, HV) enables survival in extreme normovolemic, and hypovolemic anemia[1]. However, in a clinical setting acute anemia might be accompanied by emerging tachycardia and as a consequence by an aggravation of myocar-

Downloaded from https://journals.lww.com/ejanaesthesiology by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3ZQGuDpsZHFbHV50cnCx0hs6QpGvcZWwLQhxlr4Vh13s= on 03/19/2020